

REMARKS

Claims 1-17 are all the claims pending in the application. Claims 3, 9, and 14 are objected to as being dependent upon rejected base claims, but would be allowable if rewritten in independent form. Consequently, claims 3, 9 and 14 are rewritten herein to include all of the limitations of the base claims 1, 7 and 13, respectively. Therefore, claims 3, 9, and 14 are now in condition of allowance. Claims 1-2, 4-8, 10-13, and 15-17 stand rejected upon double patenting and on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

I. The Double Patenting Rejection

Claims 1-2, 4-8, 10-13, and 15-17 stand rejected on the ground of nonstatutory double patenting over claims 1, 4, 14, and 17 of co-pending Application No. 10/717,737 that was filed by different inventive entities but with a common assignee. The Applicants respectfully traverse these rejections based on the fact that the claims of the present invention, as amended, are patentably distinguishable from claims 1, 4, 14 and 17 of Application No. 10/717,737, as discussed below. However, if necessary, once a notice of allowance is issued, the applicant will file a terminal disclaimer.

II. The Prior Art Rejections

Claims 1-2, 4-8, 10-13, and 15-17 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Zhu, et al. (U.S. Publication No. 2005/0110085), hereinafter referred to as Zhu. The Applicants respectfully traverse these rejections because Zhu does not teach or suggest several of the patentable features of independent claims 1, 7, and 13. Specifically, regarding claims 1, 7 and 13, Zhu does not teach or suggest "a first gate dielectric covering opposing sides of said first fin and a second gate dielectric covering opposing sides of said second fin, wherein said first gate dielectric has a first thickness and said second gate dielectric has a second thickness and wherein said first thickness is different from said second thickness." Regarding claim 7, Zhu also not teach or suggest

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that "said fins have different thicknesses." Regarding claim 13, Zhu also does not teach or suggest that the semiconductor structure comprises "complementary transistors on said substrate." These complementary transistors comprise the first fin and second fin with the gate dielectrics having different thicknesses, as described above.

More particularly, Zhu teaches a fin-type field effect transistor (finFET) with a single semiconductor fin. As disclosed in the Abstract, the finFET of Zhu comprises a front gate along one side of a semiconductor fin and a back gate along the opposite side of that semiconductor fin. Gate dielectrics on either side of the same fin (i.e., on the opposing sides of the fin) differ in material and/or thickness (see Figures 2L and 3K and paragraph [0023]). A nitride cap tops the fin (see Figures).

Contrarily, the present invention provides a semiconductor structure with multiple fins, e.g., first fins and second fins, on the same substrate. The opposing sides of each fin are covered with a gate dielectric that has the same thickness. However, the gate dielectric on each first fin has a thickness (i.e., a first thickness) that is different from the thickness (i.e., second thickness) of the gate dielectric on each second fin (see paragraphs [0006-9] and [0022-26]). Specifically, as illustrated in Figure 5, the gate dielectric 504 that is adjacent to the opposing sides of a first fin 114 has a first thickness, the gate dielectric 502 that is adjacent to the opposing sides of a second fin 113 has a second thickness, and the first thickness is greater than the second thickness. Furthermore, the invention can use those fins 113 and 114 that have gate dielectrics with different thicknesses in different types of transistors on the same substrate. "For example, the invention can form complementary transistors on the same substrate, or can form transistors with different voltage requirements on different areas of the substrate. Therefore, in these situations, certain types of transistor would include gate dielectrics having a first thickness and other types of transistor could include gate dielectrics having a second thickness. Also, the invention can utilize the fins in multiple-fin transistors" (see paragraph [0026]).

Independent claims 1, 7 and 13 refer to a semiconductor structure having at least one (claims 1 and 7) or multiple (claim 13) fin-type field effect transistors (FinFETs).

These independent claims, as amended, each particularly claim the feature of "a first gate dielectric covering opposing sides of said first fin and a second gate dielectric covering opposing sides of said second fin, wherein said first gate dielectric has a first thickness and said second gate dielectric has a second thickness and wherein said first thickness is different from said second thickness." In support of the rejection of these independent claims, the Office Action cites page 4 and claim 14 of Zhu as disclosing that "a plurality of fins is formed on the substrate (122, 172), each with a gate dielectric having different thicknesses." The cited portions of Zhu disclose multiple FETs and each of these FETs comprises a back gate dielectric that is thicker or thinner than another gate dielectric on the opposing side of that fin. As mentioned above, in the present invention the thickness of the gate dielectrics covering different fins on the same substrate is different, but the gate dielectric that covers both sides (i.e., opposing sides) of each individual fin (i.e., first fins and second fins) has the same thickness. Given that the thickness of the gate dielectric layer on the opposing sides of the Zhu finFETs is different, Zhu necessarily does not teach or suggest this claimed feature of independent claims 1, 7, and 13.

Independent claim 7 further claims the feature that "said fins have different thicknesses." This feature was not address in the Office Action and Zhu does not teach or suggest this feature.

Independent claim 13, as amended, further claims the feature, described in paragraph [0026], that the semiconductor structure of the invention comprises "complementary transistors on said substrate." These complementary transistors comprise "a first fin for a first type transistor and a second fin for a second type transistor extending from said substrate." As with the previously discussed independent claims, a first gate dielectric covers the opposing sides the first fin and a second gate dielectric covers the opposing sides of the second fin, the first gate dielectric has a first thickness and the second gate dielectric has a second thickness and the first thickness is different from the second thickness. While claim 14 of Zhu mentions a plurality of FETs on the same chip, Zhu does not teach or suggest such complementary FETs that are formed with fins having different gate dielectric thickness.

Additionally, the Office Action notes that the features claimed in dependent claims 2 and 8 refer to an intended use and indicates that "the recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim." Dependent claims 2 and 13 have been amended herein to reflect that not only are the fins with different gate dielectric thicknesses utilized in different transistors, but that these "different transistors have different voltage requirements" (see paragraph [0026]). The Zhu structure is not capable of performing this intended use. Zhu teaches a single fin with a thin oxide on one side and a thick oxide on the other. Two Zhu's fins on the same substrate would each have the same voltage requirements and that voltage is limited by the thinner oxide side.

Therefore, independent claims 1, 7 and 13 are patentable over Zhu. Furthermore, dependent claims 2, 4-6, 8, 10-12 and 15-17 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of the additional features of the invention they define.

Moreover, the Applicants note that all claims are properly supported in the specification and accompanying drawings, and no new matter is being added. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

II. Formal Matters and Conclusion

With respect to both the objections to and the rejections of the claims, the claims have been amended, above, to overcome these objections and rejections. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the objections to and rejections of the claims.

In view of the foregoing, Applicants submit that claims 1-17, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0456.

Respectfully submitted,

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